

ELECTRONIC INTEGRATOR

Voltage to Pulse Rate Converter

for: FLOW TOTALIZING

KW HOUR & AMPERE HOUR TOTALIZING

AVERAGE COMPUTING

ANALOG TO DIGITAL CONVERSION

LECTROCOUNT II

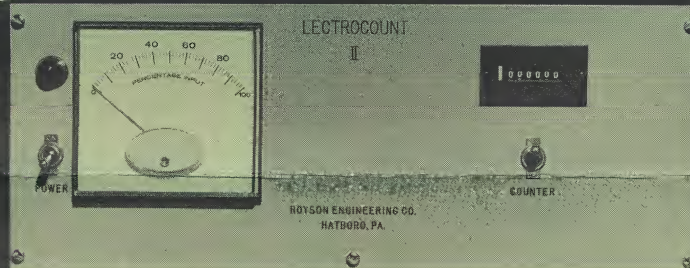
Voltage, Current or Pot Position Inputs

LECTROCOUNT III

Millivolt Inputs

D.C. VOLTS
D.C. MV
D.C. AMPS
D.C. MA
POT POSITION

Analog
Input



Digital
Output
(counts
per
minute)

—self-contained
counter
—remote counter
—pre-determining
counter
—electronic
counter
—eput meter

both featuring:

- Long term stability
- completely floating system. Input and output isolated from ground, line, and each other
- wide choice of inputs and outputs

LECTROCOUNTERS II and III

Offer Unusual Reliability and Versatility

GENERAL DESCRIPTION:

The Royson LECTROCOUNTERS II and III are completely electronic integrators, producing a continuous series of pulses whose rate at any instant is proportional to the input signal. Combining the best in solid state, miniature tubes, and advanced circuitry, they attain a high order of stability and reliability. Calibration adjustment is rarely, if ever, required. All input circuits employ solid state choppers. Those outputs that require dry contacts incorporate long life plug-in relays.

The standard models include an indicating counter to accumulate the output pulses. As an optional feature, a meter can be provided to repeat the input signal in per cent of full scale.

INPUT

The input circuitry of all models is completely floating, being isolated from ground, line and the output. The input is high impedance, and draws a negligible current from the signal source. Following are the input types that can be accepted:

Lectrocoun II

—**Slidewire or Pot Position**—any pot with a nominal resistance of 1K can be directly connected to the input. Power is supplied from the Lectrocoun, so that no external power supply is required.

—**D.C. Voltage**—any full scale voltage of 0.5 or more can be used.

—**D.C. Current**—any full scale current can be used if it can tolerate a series resistor that will produce a 0.5 volt drop.

Lectrocoun III

—**D.C. Voltage**—any full scale voltage of 10 MV or more can be used.

—**D.C. Current**—any full scale current can be used if it can tolerate a series resistor that will produce a 10 MV or more voltage drop.

Standard 50 MV shunts can be used.

Suppressed Ranges

—all ranges for both models can be suppressed to handle such signals as 4 to 20 ma, 10 to 50 MV, 1 to 5V. etc.

—adjustable suppression of plus and minus 12% or 24% in one direction can be supplied.

Meter

—as an optional feature, on either model, a meter can be mounted on the front panel to repeat the input in per cent of full scale.

OUTPUT

All output data applies to both Lectrocoun II and III. Basically, the output consists of D.C. voltage pulses at a rate proportional to the value of the input signal. On the standard models, a counter, mounted on the front panel, accumulates these pulses. A switch on the back of the chassis permits shifting of the pulses, in the form of dry contact closures, to a pair of terminals. An external counter can be operated from these contact closures.

—use of External Electro-Mechanical Counter— as an option, isolated dry contact closures can be provided in addition to the panel mounted counter.

—output pulse length—each pulse, or contact closure is "on" for 8 ms. As many electro-mechanical counters and batch controllers require longer pulse lengths, a pulse stretching circuit can be supplied as an optional feature. Consult the counter manufacturer for pulse length requirements when ordering the Lectrocoun.

Electronic Counters

The pulse requirements vary considerably for these counters. Send specs with order, or send counter itself for check-out at our shop.

Output Pulse Rates

The standard model has a full scale output pulse rate of 2000 counts per minute. As options, full scale rates of 0.2 up to 20000 counts per minute can be supplied.

PERFORMANCE SPECIFICATIONS

Lectrocoun II and III are basically similar, and operate on the same principle. They differ only in the level of the signal that can be accepted.

Accuracy

—error never exceeds 0.5% of full scale

Repeatability

—within 0.25% full scale

Line Voltage Variations

—No additional error between 105 and 125V.

Power Requirements

115V. 60 cycles—20 watts

Ambient Temperature

—will operate between 20° and 125°F.

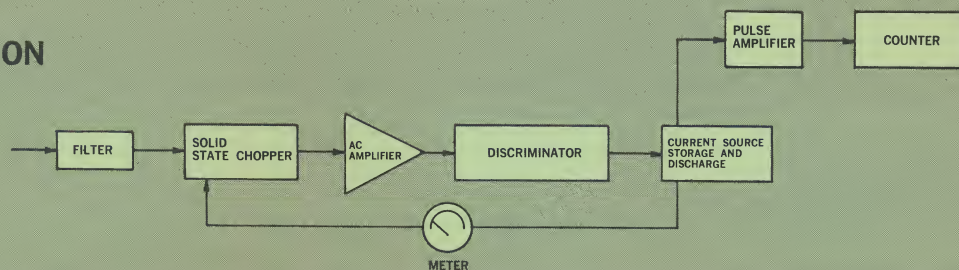
Speed of Response

—A step change in input from any signal other than zero, will result in a maximum error of .05 counts for each per cent of full scale changed. This is with a calibrated full scale output of 2000 cpm. At other rates, the error is proportional. On an upscale change, the counts are lost. On a down scale change, the counts are gained. When making a sudden change, the lag appears greater than this. However, the capacity in the input has a short term integrating effect, causing the unit to "catch up".

When making a step change from zero, the effective loss is the counts for 1.0 seconds. If the input should go negative, there is an additional lag of 2 seconds.

A.C. Common Mode Stray Rejection—100 db

BASIC OPERATION



The difference between an input voltage and a feedback voltage is compared by a solid state chopper and the difference converted to a pulsating voltage. The AC component is amplified by a transistorized amplifier. The phase sense of this signal is recognized by a conventional phase detector which converts this signal into a high value DC voltage. This voltage controls the current of a pentode having a constant value screen potential. This output current passes into a storage capacitor and through a feedback resistor to reference. The capacitor charge is dissipated through a shorting means upon build-up to a critical value depending upon the flashing rate.

To accurately compensate for the inherent time constant of the capacitor and discharge device, the thyatron discharging circuit automatically advances its trigger point sufficiently with increasing input value to insure linearity. The high order of feedback insures practically perfect linearity between the input voltage and the feedback current, while the compensations insure linearity between flashing rate and the current flow. The overall system is

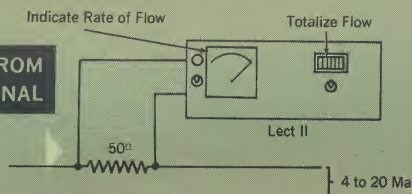
linear with impressed input as covered in the above specifications. Calibration is made by simply adjusting the value of the feedback resistor to achieve a pulse rate in accordance with the desired input value of the variable. No adjustment is required to set the zero. The system is completely floating and does not require the imposition of a ground on either terminal. However, it is permissible to ground either side or operate at a potential well above ground level.

Lectrocount II and III are basically similar, and operate on the same principle. They differ only in the level of the signal that can be accepted.

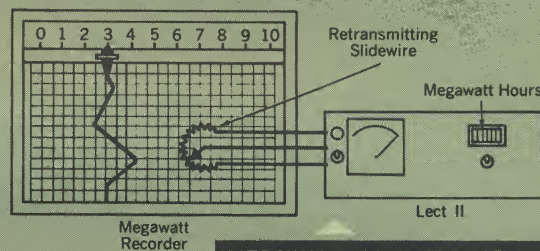
Lectrocount II and III can be supplied with an indicating meter on the front panel. This meter repeats the input signal in terms of percentage of the input. As the meter is in the feedback circuit, it does not draw any additional current from the input. Since the input impedance is on the order of several megohms, a negligible amount of current is drawn by the input of the integrator.

APPLICATIONS

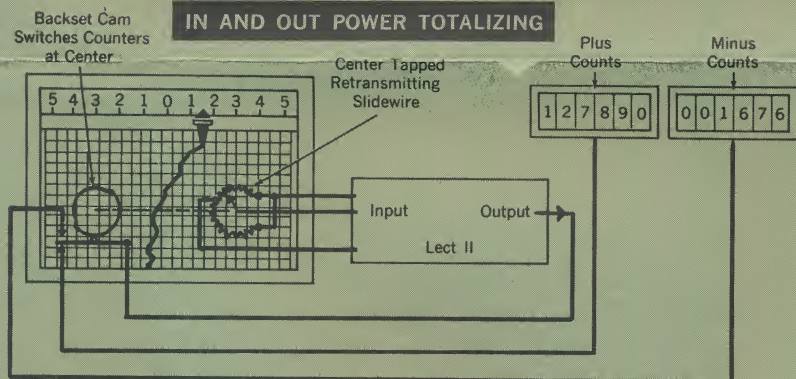
FLOW TOTALIZING FROM 4 TO 20 Ma SIGNAL



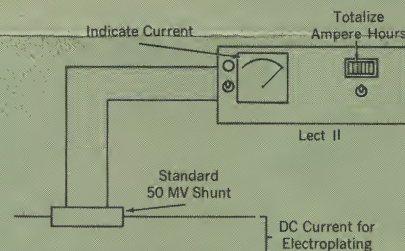
MEGAWATT HOUR TOTALIZING



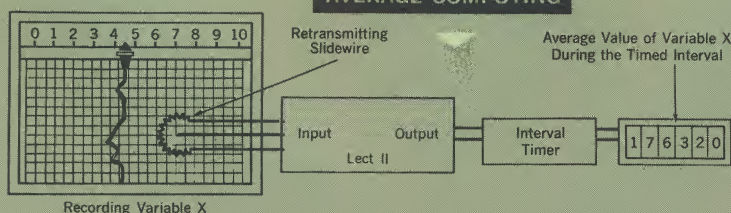
IN AND OUT POWER TOTALIZING



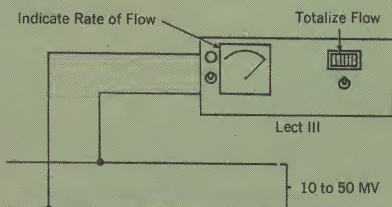
AMPERE HOUR TOTALIZING



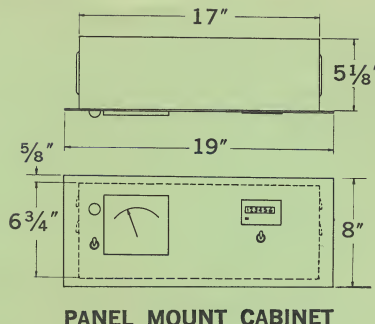
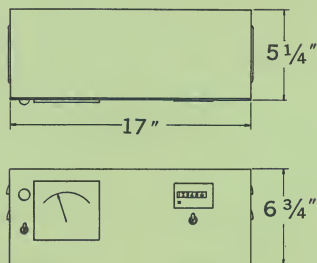
AVERAGE COMPUTING



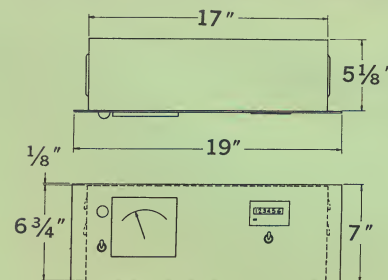
FLOW TOTALIZING FROM 10 TO 50 MV SIGNAL



BENCH TOP CABINET



19 INCH RACK MOUNT CABINET



ORDERING INFORMATION

1. See section headed "Inputs"—Select either

LECTROCOUNT II or III

- Specify the exact input signal
- If adjustable zero suppression is desired, state if it should be plus and minus or all in one direction
- If meter to repeat input is required, specify this.

2. See section headed "Outputs"

- Specify the full scale counting rate if it is other than 2000 counts per minute
- If external or remote counters are to be used, give pulse length requirements.
- Specify any special output arrangement
- If electronic counter is to be used, give details on input pulse requirements of the counter.

3. Specify one of the three cabinet types.

PRICE LIST

Prices on the optional features listed apply to Lectrocounts II & III. For descriptions of standard models and optional features see "ordering information".

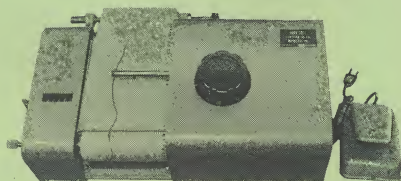
Standard Lectrocount II	\$485.00	Output full scale counting rates from 0.8 to 10 cpm	150.00	Dry contact closures in output—simultaneous with self contained counter, add	40.00
Standard Lectrocount III	590.00	6 figure predetermining counter with manual reset instead of std. counter, add	115.00	Double pole dry contact closures instead of self contained counter, add	0.00
Meter to repeat % input, add ..	45.00	6 figure predetermining counter in addition to std. counter, add ..	150.00	Pulse stretcher for operating external counters with this requirement, add	45.00
If no counter is required—subtract	40.00	Adjustable zero suppression in input	50.00		
Output full scale counting rates from 10 to 150 cpm, add ...	90.00				

Transducers are commercially available to operate Lectrocounts from: **PRESSURE; TEMPERATURE; AC CURRENT; AC WATTS; MECHANICAL MOTION**

Your inquiries are invited. Write, wire or call and fill us in with your requirements. We will quote promptly.

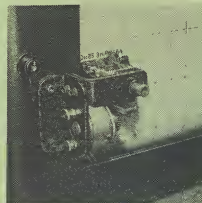
OTHER ROYSON INSTRUMENTS

Planimeter



Integrates strip chart records. Portable, simple to operate—can be supplied for linear or square root charts. Made for any chart width.

Identicharts...



eliminate chart watching and marking. Identicharts print serial numbers, code numbers or letters, date and time, or numerical count on strip charts—from a remote point, automatically and accurately.

ROYSON

ENGINEERING COMPANY

HATBORO, PA.

• (215) OSBORNE 5-2800

Royson Engineering Company

MANUFACTURING ENGINEERS . . . DESIGNERS

OSborne 5-2800 * 100 NORTH PENN STREET, HATBORO, PENNSYLVANIA 19040

SALES REPRESENTATIVES

Northern California

Lewis & Associates
607 Market Street
San Francisco 5, Calif.
Phone: YU-2-8777

Southern California

Time-Trol, Inc.
14552 Friar Street
Van Nuys, Calif. - Phone: TR-3-5151

Canada

Lisle Instrument Systems Ltd.
70 Sheffield Street
Toronto 15, Ontario, Canada
Phone: (416)-249-9151

New England States

Michael S. Coldwell, Inc.
195 West Main Street
Avon, Conn. - Phone: 677-1577

Southern States

Lynd A. Walkling & Assoc.
4360 S. W. 96th Ave.
Miami, Fla. 33165
Phone: (305) 221-0121

Indiana - Adjacent part of Kentucky

Arnold & Harcourt, Inc.
4165 Millersville Rd.
Suite L-8
Indianapolis, Ind. 46205
Phone: LI-6-4053

Michigan - Toledo, Ohio

George R. Peters Assoc.
2399 Coolidge Highway
Berkley, Mich. - Phone: 564-6325

Missouri, Kansas, Iowa (Lee county)

Illinois (Southern) - Adjacent part of Ky.
C. B. Fall Co.
317 N. 11th St.
St. Louis, Mo. 63101 - Phone: CH-1-2433

New Jersey, Eastern Penna., Northern Delaware

Engineering Sales Co.
1 Columbia Ave.
Hopewell, New Jersey - Phone: HO-6-0747

New York (Upstate)

Robert E. Vowell
275 Warren Ave.
Rochester, New York - Phone: CH-4-2161

NW and E. Central Ohio, - Erie, Penna.

Waldrip, Blankenburg, & Co.
7650 Chippewa Rd.
Brecksville, Ohio 44141 - Phone: 216-526-1100

Western Penna., Eastern Ohio, W. Va. (NW)

Bollinger & Bradford
P. O. Box 8088
Pittsburgh 16, Penna. - Phone: LO-1-2340

Texas, - Louisiana

Alpha Engineering Co.
P. O. Box 12371
Houston 17, Texas - Phone: MI-4-1961
P. O. Box 15241
Baton Rouge, Louisiana - Phone: 921-1775

Va., Md., Wash. D. C., Dela. (S), W. Va. (Eastern)

The Hildenbrand Co.
P. O. Box 1060
Fairfax, Va. - Phone: 703-280-2330

Wash. State, Ore., Alaska, Idaho, Montana

Fairman B. Lee Company
241 Central Bldg.
Seattle 4, Wash., - Phone: MU-2-1456

Wisc., Northern Illinois

Automation Engineering Co.
12740 N. River Road, 43W.
Mequon, Wisc. - Phone: FL-4-4984

Western & S. W. Ohio, - Adjacent part of Ky.

Beedle Equipment Co.
P. O. Box 36061
Cincinnati, Ohio 45236 - Phone: (513) 793-0140